Non-native mangroves of Moloka'i, Hawai'i: a socio-ecological analysis

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INTRODUCTION

- Novel ecosystems created by non-native species pose management challenges[1]
- These ecosystems require evaluation of social and ecological dynamics[2]
- Native mangroves provide numerous goods and services[3]
- Long history of land use changes on Moloka'i led to intentional introduction of mangroves in 1902[4]

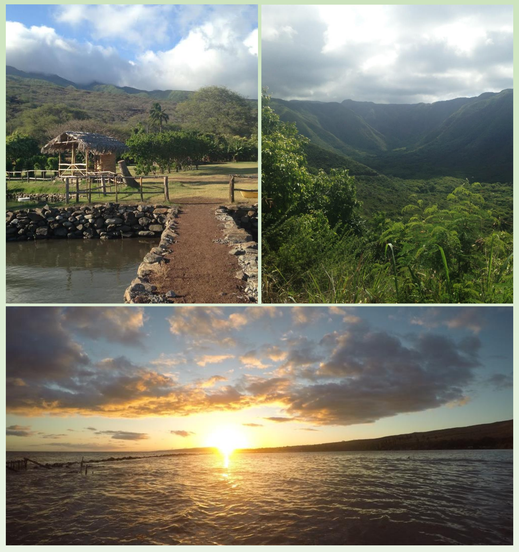

Figure 1. Fishpond (topleft and bottom) and watershed (top right) on Moloka'i, HI

RESEARCH QUESTIONS

How do non-native mangroves influence social and ecological systems? Specifically:

1. Does zooplankton community structure differ between mangrove habitat and open coast non-mangrove habitat?
2. What are residents' attitudes towards mangroves and what influences them?

Figure 2. Zooplankton specimens

METHODS

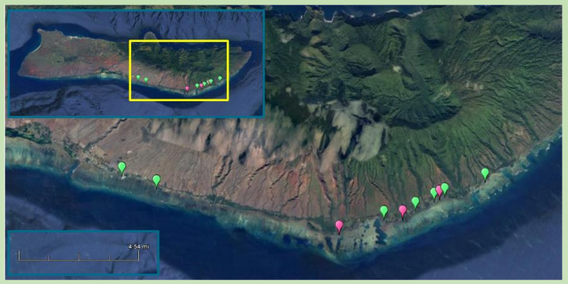

Figure 3. Southeast Moloka'i study locations. Green pins indicate paired sites within fishponds and pink pins indicate paired sites outside of fishponds

ECOLOGICAL

June 2015, light traps and plankton tows[5] deployed at 20 sites over 8 consecutive nights

Figure 4. Deploying (top) and deployed (bottom) light traps on Moloka'i, HI

SOCIAL

204 social surveys completed including Likert-style, multiple choice, and open-ended questions

Figure 5. Fishponds on Moloka'i, HI (top and bottom left) and working with local stakeholder (right)

RESULTS

ECOLOGICAL

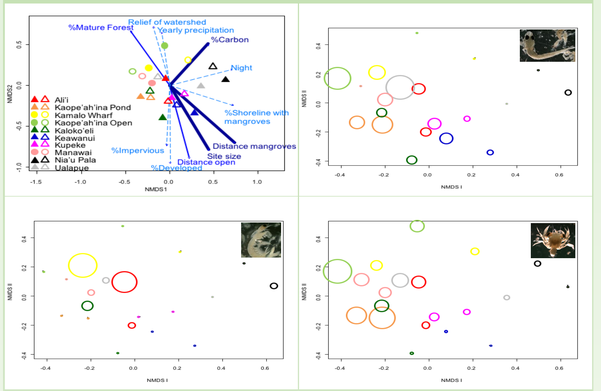

Figure 6. **A.** NMDS comparing light trap zooplankton assemblages across study sites and habitat types with environmental vectors driving assemblages (stress = 0.16). **B.-D.** Bubbles indicating changes in relative abundance of three zooplankton taxa. (▲fishpond mangrove, △fishpond non-mangrove, ●open coast mangrove, ○ open coast non-mangrove, dark thick line p=0-0.0001, thin line p=0.001-0.01, light dotted line p=0.01-0.05)

SOCIAL

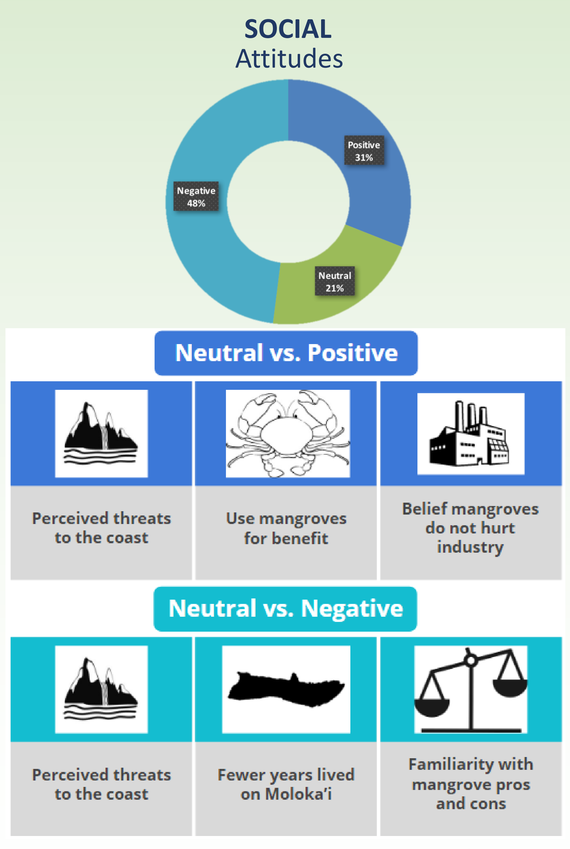

Figure 7. Attitudes towards non-native mangroves (top; Cronbach's alpha = 0.87) and most significant factors influencing negative and positive attitudes (bottom; McFadden R^2 = 0.31, Chi^2 p<0.001)

CONCLUSIONS

- Non-native mangroves provide novel habitat for zooplankton communities
- No majority positive or negative perception
- Near consensus that mangroves should be actively managed
- Integration of social and ecological systems provide comprehensive and useful results[6,7]
- Other novel ecosystems with established non-native species would benefit from socio-ecological evaluations

Figure 8. Southeast shore of Moloka'i, HI

REFERENCES

(1) Truitt et al. 2015. *Envi. Mgmt*. 55:1217-1226. **(2)** Berkes et al. 2003. Cambridge Uni. Press. **(3)** Ewel et al. 1998. *Glob. Ecol. & Biogeor. Lett*. 7:83-94. **(4)** Allen. 1998. *Glob. Ecol. Biogeogr. Lett.* 7,61. **(5)** Granek et al. 2007. *Bull. Mar. Sci.* 3,905. **(6)** Fischer et al. 2015. *Curr. Opin. in Envi. Sust*. 14:144-149. **(7)** Redman et al. 2004. *Ecosys.* 7:161-171.

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